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21125 7590 09/17/2008

NUTTER MCCLENNEN & FISH LLP
WORLD TRADE CENTER WEST
155 SEAPORT BOULEVARD
BOSTON, MA 02210-2604

EXAMINER

OPASNICK, MICHAEL N

ART UNIT

PAPER NUMBER

2626

DATE MAILED: 09/17/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/719,577

11/21/2003

Christine M. Rankovic

0103695-0002

3261

TITLE OF INVENTION: METHODS AND APPARATUS FOR MAXIMIZING SPEECH INTELLIGIBILITY IN QUIET OR NOISY BACKGROUNDS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$720	\$300	\$0	\$1020	12/17/2008

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

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If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

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III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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21125 7590 09/17/2008

NUTTER MCCLENNEN & FISH LLP
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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/719,577 11/21/2003 Christine M. Rankovic 0103695-0002 3261

TITLE OF INVENTION: METHODS AND APPARATUS FOR MAXIMIZING SPEECH INTELLIGIBILITY IN QUIET OR NOISY BACKGROUNDS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$720	\$300	\$0	\$1020	12/17/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
OPSASNICK, MICHAEL N	2626	704-225000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
- 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

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Date _____

Typed or printed name _____

Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,577	11/21/2003	Christine M. Rankovic	0103695-0002	3261
21125	7590	09/17/2008	EXAMINER	
NUTTER MCCLENNEN & FISH LLP WORLD TRADE CENTER WEST 155 SEAPORT BOULEVARD BOSTON, MA 02210-2604			OPSASNICK, MICHAEL N	
			ART UNIT	PAPER NUMBER
			2626	
DATE MAILED: 09/17/2008				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 906 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 906 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability

Application No.

10/719,577

Examiner

MICHAEL N. OPSASNICK

Applicant(s)

RANKOVIC, CHRISTINE M.

Art Unit

2626

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to response filed 8/8/2008.
2. ☒ The allowed claim(s) is/are 1 and 3-36.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☒ Other approved claim amendment 8/8/08.

/Michael N. Opsasnick/
Primary Examiner, Art Unit 2626

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview and applicants submission on 8/8/08 and 5/21/08.

Please replace all previous versions of the claims with the following marked amended claims:

1. (Currently Amended) A method of enhancing intelligibility of speech contained in an audio signal perceived by a subject via a communications path, where the communications path includes an intelligibility enhancing device having an adjustable gain, comprising:

A. generating a candidate frequency-wise gain which, if applied to the intelligibility enhancing device, would maximize an intelligibility metric of the communications path, where the intelligibility metric is a function of the relation:

$$AI = V_x E_x F_x H$$

where,

AI is the intelligibility metric,

V is a measure of audibility of the speech contained in the audio signal and is associated with a speech-to-noise ratio in the audio signal,

E is a loudness limit associated the speech contained in the audio signal,

F is a measure of spectral balance of the speech contained in the audio signal,

H is a measure of any of (i) intermodulation distortion introduced by an ear of the subject, (ii) reverberation in the medium, (iii) frequency-compression in the communications path, (iv) frequency-shifting in the communications path and (v) peak-clipping in the communications path, (vi) amplitude compression in the communications path, (vii) any other noise or distortion in the communications path not otherwise associated with V, E and F, and

B. adjusting the gain of the intelligibility enhancing device in accord with the candidate frequency-wise gain and outputting the audio signal with the intelligibility enhancing device utilizing that adjusted gain.

2.Cancelled.

3.(Original) The method of claim 1, wherein the generating step includes generating a current candidate frequency-wise gain as a function of a broadband gain adjustment of a prior candidate frequency-wise gain.

4.(Original) The method of claim 3, wherein the generating step includes performing one or more frequency-wise gain adjustments on the current candidate frequency-wise gain.

5.(Original) The method of claim 4, comprising generating a candidate frequency-wise gain that mirrors an attenuation-modeled component of an audiogram for said subject, in order to bring a sum of that candidate frequency-wise gain and that attenuation-modeled component toward zero.

6.(Original) The method of claim 5, wherein the performing step includes a noise-minimizing frequency-wise gain adjustment step comprising adjusting the current candidate frequency-wise gain to compensate for a noise spectrum associated with the communications path.

7.(Original) The method of claim 6, wherein the performing step includes a noise-minimizing frequency-wise gain adjustment step comprising adjusting the current candidate frequency-wise gain to compensate for a noise spectrum associated with the communications path, specifically, such that adjustment of the gain of the intelligibility enhancing device in accord with that candidate frequency-wise gain would bring that spectrum to audiogram thresholds.

8.(Original) The method of claim 7, wherein the performing step includes re-adjusting the current candidate frequency-wise gain to remove at least some of the adjustments made in noise-minimizing frequency-wise gain adjustment step.

9.(Original) The method of claim 8, comprising selecting as a current candidate frequency-wise gain any of a re-adjusted candidate frequency-wise gain and one or more prior candidate frequency-wise gains, where such selection is a function of which of such gains is associated with the highest intelligibility metric.

10.(Original) The method of claim 3, wherein the generating step includes generating the current candidate frequency-wise gain without substantially exceeding the loudness limit,
E.

11.(Original) The method of claim 3, comprising selecting as a current candidate frequency-wise gain any of a current candidate frequency-wise gain and one or more prior candidate frequency-wise gains, where such selection is a function of which of such gains is associated with the highest intelligibility metric.

12.(Original) The method of claim 3, comprising selecting as a current candidate frequency-wise gain any of a current candidate frequency-wise gain and a zero gain, where such selection is a function of which of such gains is associated with the highest

intelligibility metric.

13. (Original) The method of claim 1, comprising executing the performing step multiple times and choosing the candidate frequency-wise gain resulting from such execution associated with the highest intelligibility metric.

14.(Original) The method of claim 1, wherein the intelligibility enhancing device is any of a hearing aid, loudspeaker, assistive listening device, telephone, personal music delivery systems, public-address system, speech delivery system, speech generating system.

15.(Original) The method of claim 1, comprising generating a candidate frequency-wise gain that mirrors an attenuation-modeled component of an audiogram for said subject, in order to bring a sum of that candidate frequency-wise gain and that attenuation-modeled component toward zero.

16. (Currently Amended) A method of enhancing intelligibility of speech contained in an audio signal perceived by a subject via a communications path, where the communications path includes a intelligibility enhancing device having an adjustable gain, comprising:

A. generating a candidate frequency-wise gain that mirrors an attenuation-modeled component of an audiogram for said subject, in order to bring a sum of that candidate

frequency-wise gain and that attenuation-modeled component toward zero,

B. adjusting the broadband gain of the candidate frequency-wise gain so that, if applied to the intelligibility enhancing device, would maximize an intelligibility metric of the communications path without substantially exceeding a loudness limit, E, for said subject, where the intelligibility metric is a function of the relation:

$$AI = V \times E \times F \times H$$

where,

AI is the intelligibility metric,

V is a measure of audibility of the speech contained in the audio signal and is associated with a speech-to-noise ratio in the audio signal,

E is a loudness limit associated the speech contained in the audio signal,

F is a measure of spectral balance of the speech contained in the audio signal,

H is a measure of any of (i) intermodulation distortion introduced by an ear of the subject, (ii) reverberation in the medium, (iii) frequency-compression in the communications path, (iv) frequency-shifting in the communications path and (v) peak-clipping in the communications path, (vi) amplitude compression in the communications path, (vii) any other noise or distortion in the communications path not otherwise associated with V, E and F,

C. adjusting the frequency-wise gain to compensate for a noise spectrum associated with the communications path, specifically, such that adjustment of the gain of the intelligibility enhancing device in accord with that candidate frequency-wise gain would bring that spectrum to audiogram thresholds,

- D. adjusting the broadband gain of the candidate frequency-wise gain so that, if applied to the intelligibility enhancing device, would maximize an intelligibility metric of the communications path without substantially exceeding a loudness limit, E, for said subject,
- E. testing whether adjusting the candidate frequency-wise gain to remove at least some of the adjustments made in step (C) would increase the intelligibility metric of the communications path and, if so, adjusting the candidate frequency-wise gain,
- F. adjusting the broadband gain of the candidate frequency-wise gain so that, if applied to the intelligibility enhancing device, would maximize an intelligibility metric of the communications path without substantially exceeding a loudness limit, E, for said subject,
- G. choosing the candidate frequency-wise gain characteristic resulting from steps (B), (D) and (F) associated with the highest intelligibility metric,
- H. choosing between a zero gain and the candidate frequency-wise gain chosen in step (G), depending on which of such gains is associated with the highest intelligibility metric, and
- I. adjusting the gain of the intelligibility enhancing device in accord with the candidate frequency-wise gain characteristic chosen in step (H) and outputting the audio signal with the intelligibility enhancing device utilizing that adjusted gain.

17.(Currently Amended) A method of enhancing intelligibility of speech contained in an audio signal perceived by a subject via a communications path, where the communications path includes an intelligibility enhancing device, the method comprising

A: applying to the intelligibility enhancing device a frequency-wise gain (hereinafter, "applied frequency-wise gain") made by a process that maximizes an intelligibility metric of the communications path, where the intelligibility metric is a function of the relation:

$$AI = V \times E \times F \times H$$

where,

AI is the intelligibility metric,

V is a measure of audibility of the speech contained in the audio signal and is associated with a speech-to-noise ratio in the audio signal,

E is a loudness limit associated with the speech contained in the audio signal,

F is a measure of spectral balance of the speech contained in the audio signal,

H is a measure of any of (i) intermodulation distortion introduced by an ear of the subject, (ii) reverberation in the medium, (iii) frequency-compression in the communications path, (iv) frequency-shifting in the communications path and (v) peak-clipping in the communications path, (vi) amplitude compression in the communications path, (vii) any other noise or distortion in the communications path not otherwise associated with V, E and F~ and

B. outputting an audio signal with the intelligibility enhancing device utilizing the

frequency-wise gain applied in step (A).

18.(Original) The method of claim 17, wherein the process includes generating a current candidate frequency-wise gain as a function of a broadband gain adjustment of a prior candidate frequency-wise gain.

19. (Original) The method of claim 18, wherein the process includes performing one or more frequency-wise gain adjustments on a prior candidate frequency-wise gain.

20.(Original) The method of claim 19, wherein the process includes generating a candidate frequency-wise gain that mirrors an attenuation-modeled component of an audiogram for said subject, in order to bring a sum of that candidate frequency-wise gain and that attenuation-modeled component toward zero.

21.(Original) The method of claim 20, wherein the performing step includes a noise-minimizing frequency-wise gain adjustment step comprising adjusting the current candidate frequency-wise gain to compensate for a noise spectrum associated with the communications path.

22. (Original) The method of claim 21, wherein the performing step includes a noise-minimizing frequency-wise gain adjustment step comprising adjusting the current candidate frequency-wise gain to compensate for a noise spectrum associated with the

communications path, specifically, such that adjustment of the gain of the intelligibility enhancing device in accord with that candidate frequency-wise gain would bring that spectrum to audiogram thresholds.

23. (Original) The method of claim 22, wherein the performing step includes re-adjusting the current candidate frequency-wise gain to remove at least some of the adjustments made in noise-minimizing frequency-wise gain adjustment step.

24.(Original) The method of claim 23, wherein the performing step includes selecting as a current candidate frequency-wise gain any of a re-adjusted candidate frequency-wise gain and one or more prior candidate frequency-wise gains, where such selection is a function of which of such gains is associated with the highest intelligibility metric.

25.(Original) The method of claim 19, wherein the process includes generating a current candidate frequency-wise gain without substantially exceeding the loudness limit, E.

26.(Previously Amended) The method of claim 19, wherein the process includes selecting as a current candidate frequency-wise gain any of a current candidate frequency-wise gain and one or more prior candidate frequency-wise gains, where such selection is a function of which of such gains is associated with the highest intelligibility metric.

27.(Original) The method of claim 19, wherein the process includes selecting as a current candidate frequency-wise gain any of a current candidate frequency-wise gain and a zero gain, where such selection is a function of which of such gains is associated the highest intelligibility metric.

28.(Original) The method of claim 19, wherein the process includes executing the performing step multiple times and choosing the candidate frequency-wise gain resulting from such execution associated with the highest intelligibility metric.

29.(Original) The method of claim 17, wherein the process includes generating a candidate frequency-wise gain that mirrors an attenuation-modeled component of an audiogram for said subject, such that a sum of that candidate frequency-wise gain and that attenuation- modeled component is substantially zero.

30.(Currently Amended) In a device for enhancing intelligibility of speech contained in an audio signal perceived by a subject via a communications path that includes the device, the improvement comprising:

A. the device applies to the audio signal via a gain adjustment a frequency-wise gain (hereinafter, "applied frequency-wise gain") made by a process that maximizes an intelligibility metric of the communications path, where the intelligibility metric is a function of the relation:

$$AI = V_x E_x F_x H$$

where,

AI is the intelligibility metric,

V is a measure of audibility of the speech contained in the audio signal and is associated with a speech-to-noise ratio in the audio signal,

E is a loudness limit associated with the speech contained in the audio signal,

F is a measure of spectral balance of the speech contained in the audio signal,

H is a measure of any of (i) intermodulation distortion introduced by an ear of the subject, (ii) reverberation in the medium, (iii) frequency-compression in the communications path, (iv) frequency-shifting in the communications path and (v) peak-clipping in the communications path, (vi) amplitude compression in the communications path, (vii) any other noise or distortion in the communications path not otherwise associated with V, E and F and

B. the device outputs the audio signal with the applied frequency-wise gain.

31. (Original) In the device of claim 30, the further improvement wherein the process includes generating a current candidate frequency-wise gain as a function of a broadband gain adjustment of a prior candidate frequency-wise gain.

32.(Original) In the device of claim 31, the further improvement wherein the process includes per-forming one or more frequency-wise gain adjustments on a prior candidate frequency-wise gain.

33.(Original) In the device of claim 31, the further improvement wherein the process includes generating a candidate frequency-wise gain that mirrors an attenuation-modeled component of an audiogram for said subject, in order to bring a sum of that candidate frequency-wise gain and that attenuation-modeled component toward zero.

34.(Original) In the device of claim 31, the further improvement wherein the process includes a noise-minimizing frequency-wise gain adjustment step comprising adjusting the current candidate frequency-wise gain to compensate for a noise spectrum associated with the communications path.

35.(Currently Amended)A method of enhancing intelligibility of sound contained in an audio signal perceived by a subject via a communications path, where the communications path includes a intelligibility enhancing device having an adjustable gain, comprising

A. generating a candidate frequency-wise gain which, if applied to the intelligibility enhancing device, would maximize an intelligibility metric of the communications path, where the intelligibility metric is a function of the relation:

$$AI = V \times E \times F \times H$$

where,

AI is the intelligibility metric,

V is a measure of audibility of the sound contained in the audio signal and is associated with a sound-to-noise ratio in the audio signal,

E is a loudness limit associated with the sound contained in the audio signal,

F is a measure of spectral balance of the sound contained in the audio signal,

H is a measure of any of (i) intermodulation distortion introduced by an ear of the subject, (ii) reverberation in the medium, (iii) frequency-compression in the communications path, (iv) frequency-shifting in the communications path and (v) peak-clipping in the communications path, (vi) amplitude compression in the communications path, (vii) any other noise or distortion in the communications path not otherwise associated with V, E and F, and

B. adjusting the gain of the intelligibility enhancing device in accord with the candidate frequency-wise gain and outputting the audio signal with the intelligibility enhancing device utilizing that adjusted gain.

36.(Currently Amended) In a device for enhancing intelligibility of sound contained in an audio signal perceived by a subject via a communications path that includes the device, the improvement comprising:

A: the device applies to the audio signal via a gain adjustment a frequency-wise gain (hereinafter, "applied frequency-wise gain") made by a process that maximizes an intelligibility metric of the communications path, where the intelligibility metric is a function of the relation:

$$AI = V \times E \times F \times H$$

where,

AI is the intelligibility metric,

Art Unit: 2626

V is a measure of audibility of the sound contained in the audio signal and is associated with a sound-to-noise ratio in the audio signal,

E is a loudness limit associated with the sound contained in the audio signal,

F is a measure of spectral balance of the sound contained in the audio signal,

H is a measure of any of (i) intermodulation distortion introduced by an ear of the subject, (ii) reverberation in the medium, (iii) frequency-compression in the communications path, (iv) frequency-shifting in the communications path and (v) peak-clipping in the communications path, (vi) amplitude compression in the communications path, (vii) any other noise or distortion in the communications path not otherwise associated with V, E and F~ and

B. the device outputs the audio signal as transformed with the applied frequency-wise gain.

Allowable Subject Matter

2. Claims 1,3-36 are allowable over the prior art of record.
3. The following is a statement of reasons for the indication of allowable subject matter: As per the independent claims, the claim recitations toward the unique relationship between the intelligibility metric calculated within the communication device is not explicitly taught by the prior art of record. Also, the claim amendments to the independent claims now state an active

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step of modifying an audio signal and outputting the modified signal through the device (The claimed limitations now produce a useful, concrete, tangible result).

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4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Opsasnick, telephone number (571)272-7623, who is available Tuesday-Thursday, 9am-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Richemond Dorvil, can be reached at (571)272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Michael N. Opsasnick/
Primary Examiner, Art Unit 2626
9/12/08